UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL

Distr.
LIMITED

E/ECA/HUS/15

May 1985
Original: ENGLISH
FRENCH

ECONOMIC COMMISSION FOR AFRICA

Third Meeting of the Joint Intergovernmental Regional Committee on Human Settlements and Environment

Addis Ababa 22-26 July 1985

LC/NAIROBI

INDICATORS FOR REVISED BUILDING CODES AND REGULATIONS IN AFRICA

SUMMARY

There is a growing realization among construction experts in the African region that the scope of technical considerations in building codes needs to be reviewed and expanded beyond the traditional preoccupation with structural safety.

Building codes have implications not only for the construction sector but also for national economic and social development. Particularly for the latter, building codes could contribute to import substitution, domestic production of building materials, creation of employment avenues, reductions in construction costs as well as public safety. Most of the existing codes in the African region, however, contribute little to the realization of the above.

There is therefore the need to reformulate the codes in the context of who they are meant for and what they can achieve for the community. Interest should be shifted to the interface between the building and its users, the structure and its environment, the edifice and the land on which it stands. Building codes in the African region, public health legislation, community planning, and national economic development should be compatible. In order to achieve the above, there is the need for a reformulation methodology which incorporates the main interacting factors in the building process - building technology, national economic resources, requirements of the user and the goals of the society.

In addition to the reformulation methodology there is the need to develop national standards as well as establish standing review committees.

The paper briefly discusses all the above subjects and goes further by indicating the roles that should be played by national governments, research institutions, consultants and the UNECA in the reformulation exercise.

I. INTRODUCTION

1. Since their incorporation into the building process in the African region, building codes have been regarded as exclusive documents of the building authorities. It is understood that building codes could constitute some significant variables in determining the appropriateness of the settled environment. It is argued that the latter could be achieved since the codes would set guidelines and controls defining the quality of structures, regulate the efficient use and occupancy of space, materials utilization, building services, construction safety, and public health.

2. In practice, however, the existing codes had contributed little in achieving most of the above. Emphasis within the codes have been restricted to the safety and rigidity of structures while the suitability or acceptability of building materials and components have been tagged to foreign standards and specifications to the neglect of local building materials, traditional building technology and skill.

3. In effect, most of the provisions of the existing codes have become obstructive instruments to the rapid development of buildings while in other cases they contribute little to national development. There is therefore the need for the reformulation of the existing codes.

4. Several attempts have been made at the individual country level - as well as at the UNECA, to reformulate the existing codes for the region. Most of these attempts have achieved little success mainly because they have failed to analyse the causes of the current ineffectiveness of the codes. In addition, the earlier attempts to reformulate the codes failed to develop any consistent methodology which would facilitate discussion at the local level regarding the suitability of the reformulated codes. Above all, there has been a general failure to develop a framework which would incorporate the main inter-acting factors in the construction process to ensure that codes provisions could effectively resolve the existing constraints.

5. The above problems have seen briefly examined in the paper. It may be mentioned that the objective is not to provide an outright solution to the problems posed by the existing codes; rather the attempt is to develop a consistent methodology which would enable each country to undertake its own reformulation exercise.

II. IMPLICATIONS FOR NATIONAL DEVELOPMENT

6. The primary objective of building codes in the African region has been to set guidelines and controls that would define the quality of structures. To the latter extent, the subject has been inordinately controlled by engineering requirements to ensure the rigidity and safety of buildings. The implementation of the codes has however indicated that the latter has far reaching results for national economic development. Some areas of relevance to national development are briefly discussed as follows.

7. Import substitution: Quite often, building codes specify the types of building materials that are acceptable for construction. The explaination is that in order to ensure structural safety, the quality and durability of materials should have proven records. Accordingly, such materials as cement, iron/steel, glass and treated timber are universally utilized throughout the African region.

8. The above requirement of building codes has led to increased importation of building materials into the region. For example, the region imported about US$1,031 thousands worth of iron/steel products in 1973; while about US$274,703 thousands was spent on importing sawn timber alone.

9. The argument is that the existing codes have contributed to the creation of export markets for the developed countries thus constituting a major drain on the scanty foreign exchange reserves of the African region. A change in the existing codes towards the increased substitution of imported building materials could contribute substantial foreign exchange savings to the region.

10. Domestic production: Closely related to the subject of import substitution is the effect of building codes on domestic production. Several research institutions in the African region have developed suitable local building materials particularly for house construction. These materials range from clay products, through secondry timber species, natural and artificial pozzolana to agricultural waste products such as groundnut husks.

11. However, since the existing codes still depend upon foreign standards and specifications, the said products are not extensively utilized. Building codes could encourage domestic production of several materials once they are covered by the provisions.

12. Creation of employment avenues: Another major area where building codes could be relevant to national development would be to contribute towards resolving the regions' unemployment problems.

13. It is noted, for example, that in 1982, the construction sector employed 5.8, 9.5, and 4.9 per cent of the total labour force (in paid employment) in Kenya, Swaziland and Zimbabwe respectively. The above figures are low when compared with those of the industrial countries which are at an average of 10 per cent.

14. Building codes would contribute to reduce the level of unemployment in the African region if they could incorporate the extended use of local materials, the domestic production of the latter, the utilization of increased numbers of building skills trained in the informal sector and the encouragement of appropriate construction technology, at least, for house building.

15. Construction cost reduction: Another area in which building codes could have implications for national development relates to cost reduction in public construction projects. Studies conducted in some member countries indicate that several construction projects could not be completed on schedule because specifications and standards requirements could not be readily met. Delays in project completion inevitably result into cost escalations.

16. It is estimated that in 1970, the African region spent some US$5,228 millions on construction - a reasonable percentage of which could have resulted from cost overruns. The region could achieve appreciable cost reductions in construction costs with the adoption of appropriate building codes.

17. Rural-urban migration: Building codes could have indirect effects on rural-urban migration and hence upon national development. Usually, the processing of timber, clay, lime stone, agricultural waste and similar other resources for the building sector imply the establishment of industries in the rural sectors. Most of such industries utilize sizeable numbers of unskilled and semi-skilled labour which are available in the rural areas. The incorporation of locally processed materials into codes provision could contribute indirectly to the creation of job opportunities in non-urban areas and contribute to retard the trend of rural-urban migration.

18. Public health: The objectives of building codes as related to drainage and sanitation, have [illegible] implications for public health. Among the primary objectives is the need to prevent the spread of communicable diseases.

19. It is noted for example, that in 1976 out of 10,770 deaths (in Egypt) related to infective and parasitic diseases, about 2,881 were related to diarrhoea. During the same year in Mauritius, out of 471 deaths related to infective and parasitic diseases, about 70% were diarrhoeal related. Similar figures could be available on other member countries. Much of these could however be prevented under effective drainage and sanitation provisions in building codes.

20. Safety of the user and the public: A final area where building codes would be relevant to national development relates to the safety of the people. In fact, the safety factor is related in all aspects of codes, ranging from the strength and

rigidity of structures, through the prevention of fire and lightning protection of buildings. A specific subject area of codes deals with construction practice and safety.

21. It would be argued that the ultimate goal of national development is the safety and welfare of the people. In this regard, building codes would contribute to national development by protecting the safety of the user and the public.

22. Conclusion: One would therefore conclude that in the face of the current economic and social crisis confronting the African region, the time is due to reformulate the existing building codes to contribute effectively towards national economic reconstruction efforts. No longer should building codes be viewed in the restricted scope of safety and rigidity of structures. Their roles in national development - particularly import substitution, foreign exchange savings, employment creation, local production, rural-urban migration and public safety-should be equally valued. The obvious question to ask then is whether the administration of building codes has contributed to achieve any such national development objectives in the African region.

III. CONSTRAINTS POSED BY EXISTING CODES

23. It is unfortunate to indicate that the existing building codes have not contributed significantly to the development of the African region as would be expected from all the objectives noted earlier. While all the codes have been copies from similar ones administered in the countries which have colonized the individual African countries with little or no modification, the codes have not undergone any significant revisions as have been the practice in the developed countries. The result is that the administration of the codes have posed several constraints to both the construction sector and national development. Some of these constraints are the following.

24. Cumbersome procedures: The prescribed procedures for obtaining building permits are very cumbersome, ranging from the submission of applications, through recording, inspection, modification to rejection or approval. Further each application is accompanied by, at least, six different plans (submitted in triplicate) each requiring detailed technical information.

25. The constraint is that the applications require unnecessarily long periods for processing. In certain events, the application forms are lost in the process. Thus while the housing deficit of the region is on the increase, the efforts of prospective builders are frustrated by cumbersome administrative procedures.

26. Lack of clarity: Most often, the provisions of the codes lack clarity or else they utilize such technical terminologies that cannot be readily understood by the ordinary builder. Complex codes provisions could always be given different interpretations when issues of responsibility result. Above all, they could render legal enforcement rather difficult.

27. Unified codes for diversified areas: With vast geographical expanse, transcending different climatic and earthnic groups, varied traditional building technologies and local building materials, most parts of the African region adhere to unified codes. The imposition of such unified codes prohibits the full utilization of the regions'

traditional building technology, skills and materials endowments.

28. Structural design: A primary problem relating to structural design requirements contained in the codes is the inordinate engineering requirements of safety and regidity over the entire construction process. Once the design has been completed, the construction technology and building materials are dictated and construction could only proceed according to the specifications (which are foreign). Constraints often result, for example when approved materials are in short supply. The obvious results are delays in project completion and cost overruns.

29. Utilization of local building materials: A further technical constraint is that the existing codes do not encourage the utilization of local building materials. Building codes in the African region are based on foreign specifications since African countries are yet to establish their own standards and specifications. In effect, since local materials have no comparable standard and specifications, they are ignored by the designers.

30. The resulting problems are numerouse, ranging from increased imports, through drains on scarce foreign resources, increased construction costs, to frequent hold-ups in the construction process.

31. Illegal structures: Often, low-income structures which are not built to standard requirements are termed illegal structures. It would appear that with the current rate of urban growth, an approach to provide housing to the majority would be to utilize whatever resources that are available without very stringent application of foreign standards.

32. Inadequate coverage: A further constraint posed by the existing codes is that they do not adequately cover all the important areas of the construction sector. None of the existing codes provides for occupancy classification. For most countries also, the prevention of fire and lightning protection in buildings have either been omitted or inadequately covered.

33. Drainage and sanitation: Most of the approved methods specified under the codes for the disposal of garbage and human excreta pose several constraints.

34. The bucket-privy system utilized in several urban settlements of the region does not fulfil most of the basic objectives of sanitation. Where pit-latrines are used, the contents often overspill during rain storms not to mention the hazards of seepage into water tables.

35. Maintenance: Some of the codes provisions fail to appreciate maintenance difficulties that could result from the approved methods and standards. For example, open drainage channels in several settlements of the region are often chocked with solid wastes causing flood water to overflow during rain storms due to lack of maintenance. The provision of garbage collection centres in several urban areas have met with little success. Often, the garbage remains uncollected for long periods thus resulting into breeding grounds of rodents and virmine.

36. Static nature of codes: It might be observed that quality standards available in the codes are generally formulated by experts and then incorporated into the codes. In as much as these codes are not regularly reformulated with technological changes, they would tend to become static instruments and consequently, would not

respond to the needs of the majority. Unfortunately, the codes of several member countries have remained unchanged for years and thus unresponsive to changes in technology and settlement structure.

37. Affordability: Another area of concern about the existing codes is that the provisions are not often affordable by the majority of people. Building codes are meant to be implemented by individuals and the society. The basic question to ask then is whether the user can afford the costs involved. Experience from several countries indicates that the majority of the country's population cannot afford the standards set in the codes. In effect some provisions of the codes have become discriminatory instruments catering for the needs of a privileged few.

38. Acceptability: A closely related constraint is that several standards which are traditionally acceptable to the region's population have been rejected by provisions of the codes. It would be noted that much construction (particularly housing) is undertaken with traditional skill and technology. The "poto-poto" (Cameroon) and "chika" (Ethiopia) types of construction are examples. These and similar types of construction are suitable to the technology and rent capacities of the majority of the region's population. Unfortunately, they are not acceptable to the building codes in several countries. It could however be stated that the formalisation of the knowledge which the people have already acquired with particular regards to technology, skills and materials, could be great assets to the construction sector.

39. In conclusion, it would be stated that the existing building codes pose too many constraints to both the construction sector and national economy as a whole. It would therefore appear that there is a need to reformulate the existing codes.

IV. NEED FOR REFORMULATION

40. The foregoing arguements are explainatory enough and auger sufficiently for a need to reformulate the existing codes. A summary of the obvious need for reformulation are presented below.

41. Administration: The administrative aspects of the existing building codes should be reformulated in order to circumvent the cumbersome procedures and minimize delays in the processing of building permits. The codes provisions should be made clear to purpose, detail out specific objectives and identify responsibilities. Above all, the administration of building codes should emphasize assistance to the low-income builder, and participation of dwellers in the maintenance of infrastructure within the settled sectors.

42. Enforcement: Codes normally require statutory recognition and legal support for an effective enforcement. However, there is a need to re-examine the existing strict legal enforcement procedures which emphasise court action, recourse to penalties or even demolishing. There is the need to develop a gradual enforcement procedure which incorporates education, persuation and direction as against the application of statutory force which should be the last resort.

43. Structural design requirements: The structural requirements contained in the existing codes may also have to be revised. Perhaps a distinction may have to be made between high income multi-storey structures on the one hand and low-income simple

buildings on the other. For the former, a strict adherence to engineering standards and specifications would be inevitable; for the latter however, the existing requirements regarding design standards, and specifications for materials may have to be fairly relaxed. To the latter end, the extended use of traditional building skills, technology and local materials may have to be incorporated in order to reflect the user's affordability and living habits.

44. Economic considerations: The need to reformulate existing codes to reflect national economic goals cannot be neglected. The existing building codes should be reformulated to reduce imports of materials, equipments and skills, to promote the local production of materials, to encourage the extended use of local materials, to generate employment as well as contribute to retard the growing trend of rural-urban migration.

45. Public safety: Finally, there is the need to reflect more public safety measures in the codes provisions. The codes should be reformulated to include suitable drainage and garbage disposal systems, adequate means of fire protection and prevention of lightning in buildings.

46. It is only when the above changes are reflected in the reformulated codes that the latter would be contributing positively to the development of both the construction sector and the national economic development.

V. FRAMEWORK FOR REFORMULATION

47. Previous approaches: An examination of the existing reformulated building codes for some African countries indicates that several partial solutions have been proposed in order to improve upon the housing situation in the region. Four of such partial solutions common with the reformulated codes in the region include:

- setting of minimum standards for low income housing commensurate with the user's rent capacity.
- the establishment of maximum standards for housing as a means of curtailing luxury and for a more equitable distribution of average housing among the majority of the people.
- the use of local building materials as cheap substitutes for expensive imported items with the objective to promote local industry.
- the development of testing facilities as a basis for control and promotion of local standards.

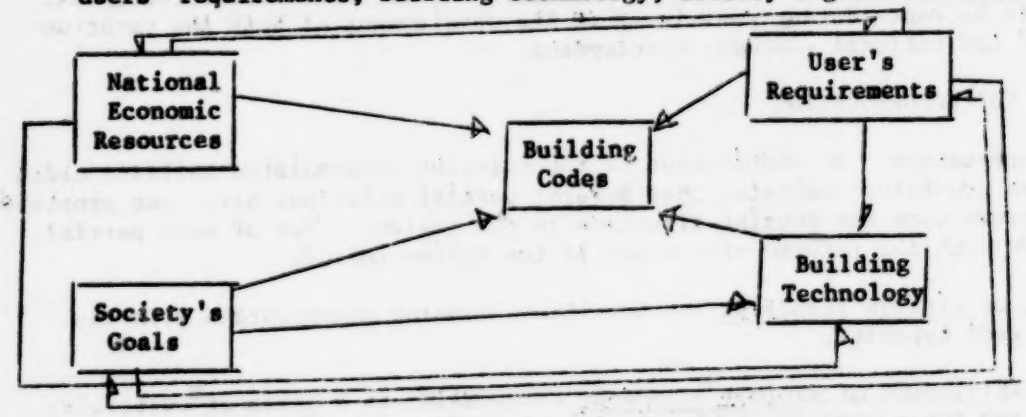
48. There is no doubt that the above solutions could be vital to the housing industry of the African region. However, while the proposals may immediately appear attractive, the objective of reformulation should not be to come up with a complete set of building codes, whether these are adapted or designed for specific countries, or whether they are based upon any of the above partial solutions. The basic question is whether the outright proposition of such solutions could facilitate any constructive discussion at the national or local levels regarding their suitability and appropriateness. Further more, such solutions may not facilitate periodic reviews, particularly by the nationals, when changes occur in the structure of the construction sector.

49. In view of the foregoing problems, it could be argued that the reformulation of building codes in the African region should aim at developing a continuing process which combines an analysis of which codes could be enforced, with a gradual development of an enforcement procedure and administration. In addition, in order to ensure that the codes are suitable to all factors, a methodology which incorporates successive stages in the development process would be very useful since it would facilitate an assessment at each stage through the comparison of relative advantages.

50. Factors for consideration: What should be noticed is that the smooth functioning of the building process involves the interacting of four main factors - building technology, national economic resources, requirements of the user and the goals of the society. Thus unless building codes are reformulated to take due account of all the above interacting factors, constraints could result, rendering the codes unsuitable.

Fig. I

Schematic programme showing the relationship among national economic resources, users' requirements, building technology, society's goals and building codes



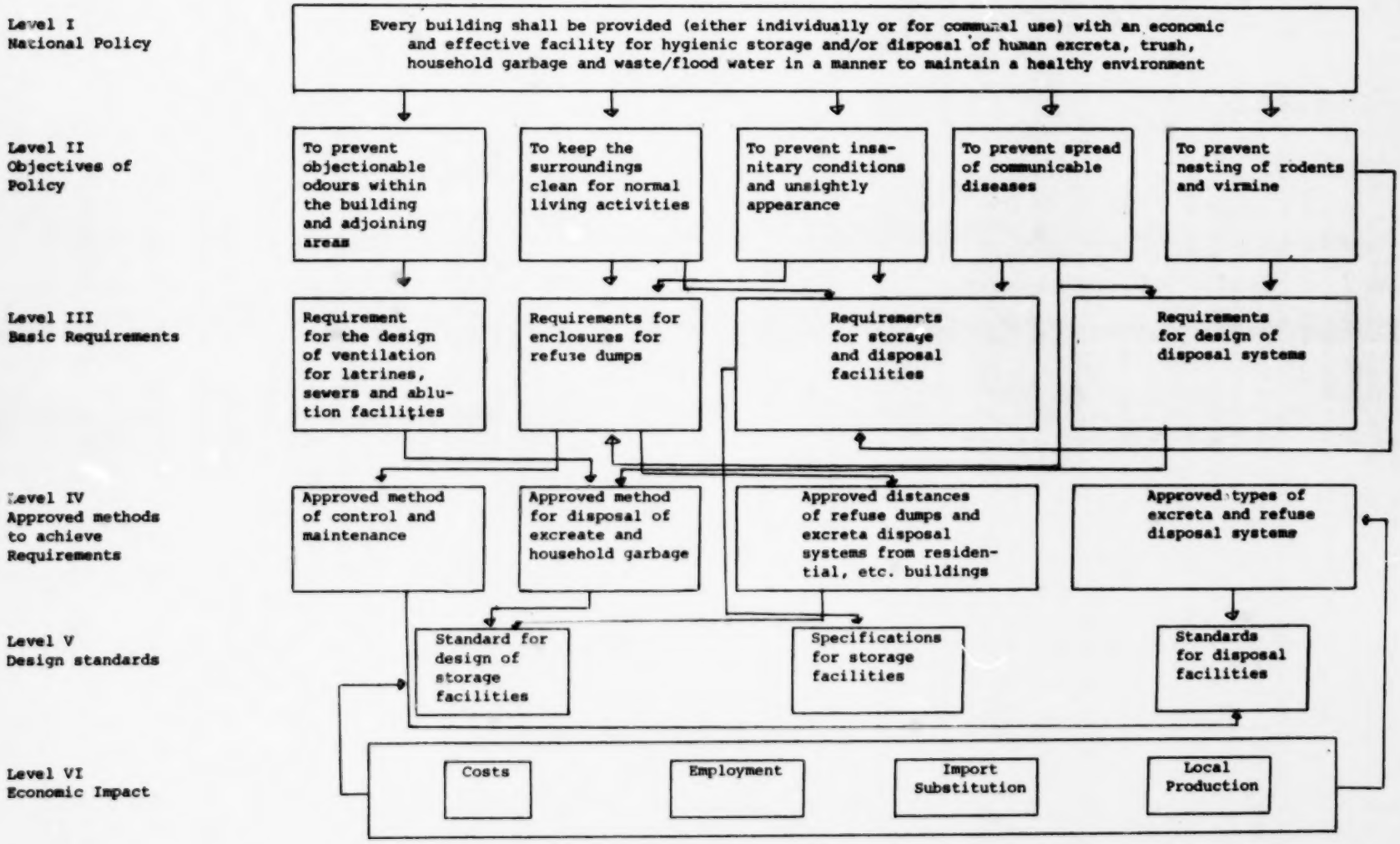
51. An examination of the existing codes in the African region would however indicate that considerations of building technology have played the dominant role in determining the nature of codes and regulations. The failure to effectively relate codes provisions to the other three factors explains the unsuitability in several respects. Once all the four factors are correlated, the existing constraints would be minimized.

52. In addition to the above, it would be necessary to decentralize the codes in order to reflect differences in settlements structure and climate, variations in earthnic, cultural, technological and materials endowments which characterize the regions indegenous building industry.

53. Finally, it would be necessary to establish a mechanism for gradually incorporating changes in building technology into the established codes provisions as well as a system for periodically reviewing the administrative and legal systems for codes enforcement.

FIGURE I

EXAMPLE: Sanitation


Level I
National Policy
Every building shall be provided (either individually or for communal use) with an economic and effective facility for hygienic storage and/or disposal of human excreta, trush, household garbage and waste/flood water in a manner to maintain a healthy environment
Level II
Objectives of Policy
To prevent objectionable odours within the building and adjoining areas
To keep the surroundings clean for normal living activities
To prevent insanitary conditions and unsightly appearance
To prevent spread of communicable diseases
To prevent nesting of rodents and virmine
Level III
Basic Requirements
Requirement for the design of ventilation for latrines, sewers and ablution facilities
Requirements for enclosures for refuse dumps
Requirements for storage and disposal facilities
Requirements for design of disposal systems
Level IV
Approved methods to achieve Requirements
Approved method of control and maintenance
Approved method for disposal of excreate and household garbage
Approved distances of refuse dumps and excreta disposal systems from residential, etc. buildings
Approved types of excreta and refuse disposal systems
Level V
Design standards
Standard for design of storage facilities
Specifications for storage facilities
Standards for disposal facilities
Level VI
Economic Impact
Costs
Employment
Import Substitution
Local Production

VI. METHODOLOGY FOR REFORMULATION

54. Based upon the foregoing discussions, it is necessary to develop a reformulation methodology for codes in the African region. The proposed methodology - evaluation method - follows four identifiable stages as indicated below.

- decentralize the country
- provide a framework
- evaluate proposed methods and standards
- evolve a gradual administrative and legal system
-

The stages are briefly discussed as follows:

55. Decentralize the country to reflect particularly climatic, and (traditional) building technological differences as well as local building material endowments. Decentralization may also be required to reflect differences in settlement structures particularly urban, pre-urban and rural settlement structures. In reformulating the existing codes, it may be necessary to prepare separate codes provisions to cover the above, whenever major differences occur. For example, where there exists the traditional technology for the use of dimensional stone and timber in different regions of one country, separate codes provisions should be made for the formal acceptance of both technologies in the codes. Different codes provisions may similarly be needed for simple rural/pre-urban buildings as against multi-storey structures found in urban settlements.

56. Provide a framework to cover the main interacting factors, namely building technology, national economic resources, requirements of the user and the goals of the society. This is needed to shift emphasis from the existing overriding requirements of structural safety and rigidity to the equally important factors mentioned above.

57. Evaluate proposed standards to ensure that they are suitable to the four interacting factors and also to indicate the successive stages of thought through which the codes would be reformulated. The latter requirement is needed to facilitate discussion by both professionals and non-professionals at the local level. The proposee evaluation procedure follows six stages of systematic development as indicated below:

Stage I — State the overall national policy regarding the subject for which the codes are being reformulated

Stage II — Identify the specific objectives of the policy

Stage III — Provide details of the basic requirements needed to achieve the objectives

Stage IV — Indicate the approved methods (or facilities) that could be used to achieve the requirements

Stage V — Specify the design standards required to implement the proposed methods

Stage VI — Analyse the impact of the approved method and design standards upon the four interacting factors

58. The process has been illustrated in Figure 2. It would be noted in the said figure that each stage serves a specific purpose, taking note of the fact that as statutory tools, building codes should originate from broad national policies aimed at achieving specific objectives. The role of the technologist is to propose appropriat alternative technical solutions that could effectively meet the objectives. However, these alternative technical solutions should only be acceptable as codes after they have been designed, based upon acceptable standards and the impact of the design is deemed to satisfy the requirements of the four interacting factors. A simplified impact analysis is presented on the four interacting factors in table I. Although the example provided in table I is rather simple, it could help in clarifying several issues. In particular, it could facilitate discussion by both professionals and non-professionals regarding the suitability of a proposed facility in a code.

Table I. Simplified Impact Analysis - Excreta Disposal

Factor/approved method		Wate Closet	Pit Privy	VIP
National Economic Resources	Costs	High	Low	Moderate
	Materials	Imported	Local	Local
	Labour	Partly foreign	Local	Local
	Production possibility	Foreign	Local	Local
	Employment opportunity	Low	Low	Moderate
Technology		Advanced	Low-cost	Intermediate
Users requirements		Very satis-factory	Not very satisfacto-ry	Satisfactory
Society's goals		Very satis-factory	Not very satisfacto-ry	Satisfactory
Opportunity cost		High	Low	Low
Sectoral application		Urban (with running water)	Rural	Urban and Rural
Recommendation (Decentralization)		For urban (with running water)	Rural	Urban and Rural

59. Evolve a gradual administrative and legal system for enforcement, which incorporates persuation, government assistance and local participation as against the use of statutory force which should be the last resort.

60. In addition to the proposed methodology, two other areas require attention, namely:

- the development of local/national standards
- the establishment of a review committee

61. A standing committee for the periodic review of the codes would be essential to keep the latter in line with changes in building technology as well as for the incorporation of newly developed building materials. On the other hand, the continued utilization of foreign standards and specifications would imply the continued importation of building materials and the neglect of available local building materials. Under such conditions, the reformulated codes could degenerate into further obstructive instruments. The development of national standards would therefore be an eventual complement to any reformulation methodology.

VII COLLABORATIVE FUNCTIONS

62. The effective reformulation of existing building codes of the region would require the co-operation of all institutions involved in the building process. Some of these institutions and their roles are discussed as follows:

63. National governments: African governments have the key role to play in the reformulation of existing building codes for their respective countries. Among others, the governments should provide the needed financial support for reformulation and periodic review of codes. In line with the latter, governments should establish standing committees which should assume the responsibility of reviewing the codes from time to time according to structural changes in settlements, and innovations in building technology. A final responsibility of the government would be to provide the necessary statutory legislation or legal backing for the effective administration of the codes.

64. Research institutions: These could contribute towards the reformulation of building codes in three main areas, namely:

- provision of data
- development of national standards and specifications for materials and components
- development of a data bank

65. Research institutions have the main function of providing data on new building materials and appropriate building technology for incorporation into the revised codes. Particularly for the African region, several local building materials have been developed through research, although their utilization has been hampered by restrictions imposed by the provisions of the codes. Data on such developments could be incorporated into the revised codes.

66. Another area where research institutions could be effective is the development of national standards and specifications for materials and components. As noted earlier

the African region still depends upon foreign standards and specifications. Even with regards to some locally developed building materials, no comparable standards have been provided. The result is that designers have difficulty in incorporating most of such local materials into their works. Research institutions would be useful in developing such standards and specifications on national or even sub-regional levels.

67. A final role of the research institutions would be to develop data banks on the entire construction sector. This would facilitate the reformulation exercise since relevant data could always be available at the data banks. Research institutions could also constitute the nucleus of the review committees.

68. Consultants and contractors: with their practical experiences in the design and construction of buildings and related infrastructure, consultants and contractors could provide data on local soil and climatic conditions for incorporation into the data banks. Consultants could also participate directly in the reformulation exercise.

69. UNECA: The UNECA by virtue of its wide experiences in building conditions throughout the African region as well as close relations with other regions of the world would be effective in providing necessary data to individual countries to assist in reformulating the codes. Similarly the ECA could be effective in establishing data banks and the interchange of information among member countries. Finally, where resources are available, the ECA could directly assist member countries or groups of countries in reformulating their existing codes.

VIII CONCLUSION

70. The basic causes of the unsuitability of existing codes in the African region stem among others from four basic causes:

- The inordinate emphasis on structural safety without due attention to other equally important factors.
- Failure to revise the codes periodically in the presence of technological changes.
- The absence of national or local standards and specifications which tends to mitigate against the use of local building materials and technology.
- The adoption of unified codes which disregard geographical diversity, traditional building skills/art and local building materials endowments.

71. An acceptable reformulated building code should provide effective solutions to all the above. To that latter end, there is the need to develop a consistent methodology for reformulation which would enable both professional and non-professionals to evaluate the relative advantages and disadvantages of proposed standards and methods. In addition, there is the need for member countries to develop their national standards and also to review the codes periodically.